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ABSTRACT

The study reported in this paper examined the level of gender segregation between disciplinary groupings in faculty members' career concepts and in the job characteristics they value in their work. Specifically, the study contrasted perceptions of faculty members in female-dominated disciplinary groupings with those in male-dominated groups. The research involved a secondary analysis of data collected in an Austin and Rice (1987) study on faculty members in small, private liberal arts colleges. A total of 4,271 faculty from 142 colleges responded to a survey (46% of the 9,204 full-time faculty surveyed) concerning perceptions of the academic workplace. Among this respondent group only those who reported a faculty rank of assistant professor or higher were included in the study. Of the 3,922 respondents in this final sample, 64% were male and 36% female, with an average age of 46 years. The study divided the respondents into Biglan's (1973) disciplinary identification categories (soft/pure, hard/applied, hard/pure, soft/applied) and analyzed the responses, using multiple group discriminate analysis, within the following variables: personal; role; intrinsic value; and extrinsic value. Analysis suggested that disciplinary groups of liberal arts college faculty members displayed differences primarily in their demographic composition rather than in their career concepts or what they valued about their work. However, a significant number of differences between faculty groups remain unexplained. Future uses of Austin and Rice (1987) data should address gender differences in faculty perceptions and values without the disciplinary component. The report contains 10 tables, 5 graphs, 24 references, and an appendix showing the disciplinary categories. (GLR)

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GENDER SEGREGATION AMONG DISCIPLINARY GROUPS IN LIBERAL ARTS COLLEGES: AN EXAMINATION OF DIFFERENCES IN CAREER CONCEPTS AND WORK VALUES

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Introduction

While a number of studies on the profession warn of declining faculty morale and job satisfaction nationwide (Bowen & Schuster, 1986; Boyer, 1987; Carnegie Foundation, 1987; Ladd & Lipset, 1977), a study of small liberal arts colleges for the Council of Independent Colleges (Austin & Rice, 1987; Austin, Rice, & Neal, 1988; Rice & Austin, 1988) reports a higher level of faculty morale, job satisfaction, and commitment than previously expected. While the average level of morale scored slightly on the positive end of the scale, satisfaction levels recorded an even higher average. By discovering conditions that promote faculty morale and job satisfaction, Rice and Austin (1988) provide assistance to administators in designing, improving, and sustaining the faculty work environment.

Austin and Rice (1987) suggest that future analyses of liberal arts colleges view faculty members as a collection of subgroups rather than as a homogeneous population. Liberal arts college faculty members often reflect a superficial homogeneity due to their common commitment to teaching, students, the liberal arts, and their particular institution. Research that looks for areas of diversity among liberal arts college faculty may reveal differences in perceptions and aspirations while clarifying the composition of the faculty. This study examines the level of gender segregation between disciplinary groupings of faculty members, and analyzes differences between the groupings in career concepts and in the job characteristics they value in their work. Specifically, this study contrasts perceptions of faculty members in female-dominated disciplinary groupings with those in male-dominated groups

to provide introductory information on the role of gender in explaining disciplinary differences between liberal arts college faculty members.

Theoretical Framework

This study builds upon a theoretical framework that links various job, environmental, and personal characteristics to certain outcomes of work, such as productivity, commitment, vitality, and satisfaction. Hackman and Oldham (1980) consider the fit between worker and job as the major influence on organizational productivity. They offer a theoretical model of job design in wnich various job characteristics contribute to high general job satisfaction, high internal work motivation, and high work effectiveness. Important job characteristics in their model include skill variety, task identity, task significance, autonomy, feedback from the job, and an opportunity to deal with otners tnrough tne work.

Job Satisfaction

Powers and Powers (1983) emphasize the importance of worker participation in decision making to promote motivation, performance, and satisfaction. Herzberg et al. (1959) contend that factors of the work itself, as well as opportunities for responsibility and advancement, serve as motivators that influence job satisfaction. Elements of the job situation, such as company policy, supervision, and working conditions serve as hygiene factors that influence dissatisfaction. The factor of salary, while borderline, seems to serve more as an influence on job dissatisfaction than satisfaction.

Gender Differences

Hollon and Gemmill (1976) report significant differences between female community college faculty members and their male counterparts in perceived

participation in decision making, job related tension, job involvement, and overall job satisfaction. While female faculty members reported lower levels of participation, involvement, and satisfaction, they experienced higher levels of job related tension. Stone (1988) examined the career process of women at three Maine colleges to compare with Baldwin's (1979) study on career stages of male faculty members to determine if common faculty experiences and characteristics exist. His study shows that male and female faculty members share a number of concerns and interests, including a concern for teaching and students, as well as motivation through internal factors rather than through external rewards. In spite of these similarities, Stone contends that Baldwin's theory of career development does not adequately describe the careers of most of the women in his study.

Not only do women differ from men in their career development, but they differ in how they experience working conditions as well. Ethington, Smart, and Zeltmann (1988) observe that while working conditions for women may vary across institutions and disciplines, they tend to hold lower status positions and are disproportionately represented in those institutions and disciplines that are experiencing the greatest difficulty. Finkelstein (1987) concurs by presenting a summary of working conditions for women in academe: (a) women tend to be segregated by discipline and institutional type, (b) women suffer from disproportionate representation at the lower faculty ranks, (c) women generally gain promotion at a slower rate than men, (d) women receive compensation at a rate averaging 85% of their counterparts, and (e) women play a lesser role in administration and governance.

Ransom (1990) analyzes the level of gender segregation among the disciplines using indexes from the fields of economics and sociology. While women have begun to penetrate many male dominated fields in recent years, the

reduction in the overall level of segregation by field has been small. In addition, many female dominated fields, such as nursing and education, have experienced a gradual reduction in the number of male faculty members for the past few years.

Methodology

This study performs a secondary analysis of Austin and Rice's (1987) data on faculty members in small, private liberal arts colleges. While their study summarizes data on faculty as a single group nationally or by campus, this study divides faculty members into disciplinary groupings. Using Biglan's (1973) disciplinary categories of hard/soft and pure/applied, four faculty subgroups serve as the basis for an examination of disciplinary differences in personal characteristics, particularly gender, as well as career concepts and in the job characteristics they value in their work. Specifically, this secondary analysis pursues three research questions:

1. How do disciplinary groupings of liberal arts college faculty members differ in their personal characteristics, particularly gender and academic rank?

2. How do these groupings differ in their career concepts?

3. How do disciplinary groupings differ in the job characteristics they value in their work?

Population and Sample

This study performs a secondary analysis of data collected as part of a study on the academic workplace in liberal arts colleges (Austin & Rice, 1987). Sponsored by the Council of Independent Colleges (CIC), all but four of the 142 participating colleges are CIC member institutions, and all are

undergraduate institutions with enrollments under 3,000. While all of the participating institutions share the characteristic of private governance, a number of the colleges maintain some type of church affiliation, while others remain independent institutions.

The individuals included in this study represent a sample of the 4,271 faculty repsondents to a survey concerning perceptions of the academic workplace (46% of the 9,204 full-time faculty surveyed at the 142 participating colleges). Among this respondent group, 3,922 reported a faculty rank of assistant professor, associate professor, or full professor. Faculty respondents reproting the rank of lecturer, instructor, emeritus professor, or "other" were not included in this study.

Among the 3,922 faculty respondents, 64% were male and 36% female, with an average age of 46.33 years. Over 65% held the rank of associate or full professor, while 34% represented the junior rank of assistant professor. On average, the faculty respondents had been employed at the college where they taught at the time of the study for 12.14 years.

According to Biglan's (1973) disciplinary categories, 27% of the respondents taught in hard disciplines, while 73% taught in soft disciplines. Similarly, 70% of the participating faculty members taught in pure disciplines and 30% taught in applied areas. If given a choice, 86% of the respondents indicated that they would probably or definitely choose a faculty career again.

Variable Selection

Disciplinary Category. To determine disciplinary differences in personal characteristics, career concepts, and job characteristics that faculty members value in their work, Biglan's (1973) dimensions of hard/soft and pure/applied serve as the dependent variable for the discriminant analysis in this study.

Following Roskens and Creswell's (1981) augmented list of disciplinary classifications (see Appendix A), faculty members were placed in one of four groups on the basis of their disciplinary identification on the survey (HP = hard/pure, HA = hard/applied, SP = soft/pure, SA = soft/applied).

Personal Variables. The personal variables used in this study include gender, age, academic rank, and number of years as a faculty member at the college studied. The categorical variables of gender and academic rank were coded as dummy variables. Age and number of years were entered into the analysis as continuous variables.

Role Variables. The role variable set includes five variables which measure the extent to which faculty members identify five "career concepts" as descriptive of their vision for their career. Driver (1980) defines "career concepts" as the conceptual structure underlying a person's thinking concerning his or her career. Austin and Rice (1987) modified Driver's theory of career concepts to create five career goals for their faculty survey. Using a 5-point Likert-like scale ranging from not at all (1) to to a very great extent (5), faculty members responded to the following career descriptions:

1. Intermittent. I expect that I will have a diverse work experience. I expect my working years will involve continued college-level teaching combined simultaneously with additional work outside higher education. Or, I may intersperse periods of college teaching with other periods during which I work primarily outside academe.

2. Steady State. I expect that I will live out my vocation as a faculty member at the college where I currently teach or at a similar liberal arts college. I have a strong commitment to contributing to this kind of college.

3. Linear Research. During the course of my career, I hope to move from a faculty position at a small college to a faculty position at a research university.

4. Linear Administration. During the course of my career, I hope to move from a faculty position into some administrative work at this college or at another college or university.

5. Spiral. I expect to continue working in higher education (either at this institution or another), but I hope the particular responsibilities and roles I undertake will be diverse over the years. I am interested in using my abilities in various ways as opportunities arise.

Intrinsic Value Variables. Austin (1989) contends that while intrinsic dimensions of work may be difficult to see or measure, they cannot be ignored when considering ways of sustaining satisfaction and motivation. This study examines disciplinary differences in the job characteristics that faculty members value in their work based on Herzberg et al.'s (1959) research on motivation factors, Hackman and Oldham's (1980) discussion of important intrinsic dimensions, and Schein's (1985) definition of career anchors as work-related elements that serve as the underlying motivation for work. Based on this theoretical framework, the intrinsic variable set includes variables on opportunities pertaining to autonomy, variety, service, creativity, leadership, and specialization. As a part of the Austin and Rice (1987) study, the faculty survey asked respondents to indicate the value they place on various intrinsic aspects of their work, using a 5-point Likert-like scale ranging from not at all (1) to to a very great extent (5). Austin and Rice present the variables as descriptive phrases:

1. Autonomy. Freedom to choose my own work activities, my hours, and so forth.

2. Variety. The availability of a great variety of challenges and types of assignments and work responsibilities.

3. Service. The opportunity to be of service to others.

4. Creativity. The opportunity to create or develop something that is entirely my own idea.

5. Leadership. The opportunity to supervise, influence, and lead others.

6. Specialization. The opportunity to become highly specialized and highly competent in a specific disciplinary area.

Extrinsic Value Variables. In addition to the relationship of intrinsic job factors to satisfaction, research suggests that extrinsic factors also relate to satisfaction. Herzberg et al. (1959) emphasize the importance of extrinsic, or hygiene, factors in minimizing worker dissatisfaction. Austin and Gamson (1984) discuss the level of workload, the nature and quality of working conditions, and the level of salary and other tangible benefits as important extrinsic elements of work. Among Schein's (1985) career anchors, the characteristics of Prestige and Security could be considered extrinsic factors. Powers and Powers (1983) suggest that worker participation in decision-making serves as a fundamental influence on job satisfaction, motivation, and performance. As with the intrinsic variable set, the extrinsic factors for this study result from the Austin and Rice (1987) faculty survey. The respondents indicated the value they place on extrinsic aspects of their work as presented by the following descriptive phrases:

1. Prestige. The opportunity to be identified with a particular college and the prestige that accompanies that college.

2. Security. The opportunity to be in an organization that provides security through guaranteed work, benefits, a good retirement, and so forth.

3. Academic Involvement. The opportunity to be involved in decision making on academic issues.

4. Nonacademic Involvement. The opportunity to be involved in decision making on nonacademic issues.

Analysis

The data analysis for this study consists of a multiple group discriminant analysis to identify differences in personal, role, intrinsic, and extrinsic variables between four disciplinary groupings (hard/pure, hard/applied, soft/pure, soft/applied). Lohnes (1988) defines discriminant analysis as a special case of regression analysis that uses a nominal dependent variable. In a discriminant analysis, the researcher looks for two or more linear functions that best separate three or more groups.

The discriminant analysis entered each variable set (personal, role, extrinsic, intrinsic) individually to identify variables that serve as significant discriminators. A combined analysis then entered all discriminating variables as a single set. After identifying significant variables that distinguished between the four groups, plots of the group centroids, based on the discriminant functions, provided a visual pattern of the differences between the disciplinary groups. While the statistical technique is robust (Klecka, 1980), the use of categorical data as dummy variables and the use of modestly intercorrelated variables violate some of the assumptions of the discriminant analysis technique. The results, however, should not be significantly altered, but significance tests should be viewed tentatively.

Findings

As listed in Table 1, 3,547 of the 3,922 faculty members were selected for the discriminant analysis after removing responses that did not provide disciplinary identification. The resulting group closely resembled the original sample in its distribution by disciplinary category. Over half of the respondents (53%) comprised the soft/pure group, while only 8% taught in a hard/applied discipline. The remainder of the faculty members were evenly divided between the hard/pure (19%) and soft/applied (20%) categories.

Descriptive Statistics

Before performing the discriminant analyses, descriptive statistics were calculated on each of the four variable sets for all of the disciplinary groups, as well as for all faculty members combined. Categorical variables in the personal variable set (gender, academic rank) were compared using the chi-square statistic for multiple groups (see Table 2). Likewise, continuous or truly ordinal variables in each of the four variable sets were compared by analysis of variance. Means, standard deviations, and number of responses are also listed on Table 2. Differing response numbers among the variables reflect missing data elements.

Due to randomly missing data elements, a listwise deletion of cases with missing data occurred before each discriminant analysis. This deletion assured comparable samples, and reduced the sample from 3,547 to 3,156 for the combined discriminant analysis (see Table 1). The reduction in sample size, however, did not change the relative proportion of faculty members in the four disciplinary categories.

Table 3 displays intercorrelations among the continuous variables considered for the discriminant analyses. Due to a strong correlation between

Table 1

Number and Percentage of Faculty Members in Disciplinary Categories

Disciplinary Category	Sample in Study N (%)	Selected for Analysis N (%)	Used in Discriminant Analysis N (%)
Hard/Pure	708 (18)	663 (19)	583 (19)
Soft/Pure	2,035 (52)	1,889 (53)	1,655 (52)
Hard/Applied	342 (9)	273 (8)	259 (8)
Soft/Applied	837 (21)	722 (20)	659 (21)
Total	3,922 (100)	3,547 (100)	3,156 (100)

the variables of age and years at college, the age variable was not included in the analyses. All discriminant analyses utilized a stepwise entry method for the variables, with the criterion F to enter set at a significance level of .10. The F to enter values are listed in Table 5 only for those variables that met the .10 entry criterion. If a variable met the criterion, or loaded strongly on a statistically significant discriminant function, it was retained for the combined analysis. Table 4 reports the results of five separate analyses. The first four discriminant analyses entered each variable set separately, while the fifth analysis combined all significant variables to create a four-group model.

Personal Variables

All personal variables met the F to enter criterion and entered the stepwise discriminant analysis (see Table 5). The first two functions were significant and together explained 14.2% of the variance between groups (see Table 4). The first function was characterized by female gender and assistant

Table 2

Descriptive Statistics on Personal, Role, Intrinsic Value, and Extrinsic Value Variables for Discriminant Analysis of Four Disciplinary Groupings of Faculty Members

Continuous Variables	Hard/Pure N = 663 M (SD)	Soft/Pure N = 1,889 M (SD)	Hard/Applied N = 273 M (SD)	Soft/Applied N = 722 M (SD)	All Groups N = 3,547 M (SD)	F	df
Personal Variables							
Age (N = 3,498)	46.51 (9.59)	46.72 (9.59)	43.90 (8.33)	46.05 (9.52)	46.33 (9.48)	7.26**	3/3494
Years at College (N = 3,540)	14.10 (9.44)	13.12 (8.95)	6.17 (5.10)	10.05 (8.01)	12.14 (8.62)	77.20**	3/3536
Role Variables							
Intermittent (N = 3,487)	2.65 (1.17)	2.74 (1.31)	3.42 (1.02)	3.13 (1.28)	2.85 (1.26)	40.44**	3/3483
Steady State (N = 3,503)	4.40 (0.84)	4.18 (1.00)	3.58 (1.13)	4.01 (1.10)	4.14 (1.01)	47.76**	3/3499
Linear Research (N = 3,479)	1.52 (0.79)	1.84 (1.09)	1.99 (1.03)	1.63 (1.00)	1.75 (1.02)	23.98**	3/3475
Linear Administration (N = 3,477)	1.87 (0.96)	1.97 (1.13)	2.44 (1.33)	2.33 (1.27)	2.06 (1.15)	33.17**	3/3473
Spiral (N = 3,491)	3.41 (1.10)	3.55 (1.17)	4.01 (0.92)	3.74 (1.08)	3.60 (1.12)	23.41**	3/3487
Intrinsic Value Variables							
Autonomy (N = 3,516)	3.85 (0.82)	4.03 (0.80)	4.04 (0.87)	3.98 (0.84)	3.99 (0.82)	7.93**	3/3512
Variety (N = 3,501)	3.52 (0.91)	3.56 (0.94)	3.84 (0.87)	3.75 (0.86)	3.62 (0.91)	13.82**	3/3497
Service (N = 3,484)	3.92 (0.81)	4.05 (0.82)	4.07 (0.78)	4.10 (0.80)	4.04 (0.81)	6.21**	3/3480
Creativity (N = 3,511)	3.87 (0.86)	4.08 (0.86)	4.10 (0.84)	3.99 (0.87)	4.02 (0.86)	10.24**	3/3507
Leadership (N = 3,493)	3.29 (0.98)	3.39 (1.03)	3.74 (0.99)	3.66 (0.99)	3.45 (1.01)	26.23**	3/3489
Specialization (N = 3,496)	3.18 (1.03)	3.42 (1.04)	3.80 (0.92)	3.37 (1.03)	3.39 (1.03)	24.40**	3/3492
Extrinsic Value Variables							
Prestige (N = 3,451)	3.10 (1.02)	3.17 (1.08)	3.35 (1.02)	3.38 (1.01)	3.22 (1.05)	10.82**	3/3447
Security (N = 3,486)	3.57 (0.95)	3.75 (0.97)	3.87 (1.02)	3.71 (1.05)	3.72 (0.98)	7.88**	3/3482
Academic Involvement (N = 3,192)	4.13 (0.68)	4.21 (0.68)	4.17 (0.68)	3.99 (0.74)	4.15 (0.69)	16.59**	3/3188
Nonacademic Involvement (N = 3,161)	3.16 (0.71)	3.23 (0.70)	3.19 (0.70)	3.14 (0.78)	3.19 (0.72)	2.92*	3/3157
Categorical Variables	%	%	%	%	%	χ^2	
Personal Variables							
Gender (N = 3,537)							
Male	76.7	66.8	21.3	62.9	64.3	269.16**	
Female	23.3	33.2	78.7	37.1	35.7		
Academic Rank (N = 3,547)							
Assistant Professor	24.6	31.3	65.9	40.3	34.5	232.49**	
Associate Professor	30.2	30.7	27.1	36.1	31.4		
Full Professor	45.2	38.0	7.0	23.5	34.0		

*$p < .05$
**$p < .01$

Table 3

Intercorrelations Among Continuous Variables Included in Discriminant Analysis

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	1.00																	
2. Years at College	.67	1.00																
3. Intermittent	-.17	-.21	1.00															
4. Steady State	.35	.36	-.28	1.00														
5. Linear Research	-.35	-.31	.09	-.44	1.00													
6. Linear Administration	-.15	-.16	.10	-.12	.14	1.00												
7. Spiral	-.15	-.16	.27	-.14	.14	.37	1.00											
8. Autonomy	-.15	-.09	.07	-.06	.14	.00	.06	1.00										
9. Variety	-.05	-.07	.16	-.03	.02	.23	.36	.18	1.00									
10. Service	.10	.07	.06	.15	-.13	.04	.07	.14	.27	1.00								
11. Creativity	-.03	-.05	.08	-.05	.14	.09	.18	.29	.30	.17	1.00							
12. Leadership	-.02	-.05	.13	-.01	.02	.30	.23	.10	.46	.28	.28	1.00						
13. Specialization	-.02	-.08	.08	-.10	.24	.00	.06	.21	.09	.07	.22	.12	1.00					
14. Prestige	.12	.08	.00	.11	.03	.10	.07	.09	.22	.18	.16	.30	.20	1.00				
15. Security	-.01	.02	-.03	.06	.03	.07	.06	.15	.14	.12	.21	.21	.19	.32	1.00			
16. Academic Involvement	.00	.06	-.05	.07	.02	.06	.06	.13	.11	.07	.13	.12	.03	.05	.06	1.00		
17. Nonacademic Involvement	-.07	-.03	.05	-.02	.01	.07	.07	.05	.10	.07	.07	.12	.05	.03	.07	.33	1.00	
18. Satisfaction	.20	.16	-.13	.42	-.30	-.09	-.12	-.06	.01	.11	-.07	.01	-.08	.07	-.03	-.05	-.13	1.00

Table 4

Results of Discriminant Analyses Conducted Across Four Groups of Faculty Members Based on Biglan's Disciplinary Categories

Variable Set	Percentage of Between-Group Variance Explained by Function I	II	III	Percentage of Explained Variance in First Three Functions
Personal	12.9*	1.3*	0.1	100
Role (Career Concept)	6.7*	1.7*	--	100
Intrinsic (Value)	2.8*	1.0*	0.4*	100
Extrinsic (Value)	1.9*	0.7*	--	100
Four-Group	16.9*	5.3*	1.7*	100

*$p < .01$

professor rank. The second function was characterized by full professor rank and years of service at the college. Comparison of the means and group centroids (see Table 6) showed that faculty members in the hard/applied group (Nursing, Computer Science, etc.) were more likely to be female assistant professors than members of the other groups. Faculty members in the hard/pure group (Mathematics, Physics, Chemistry, etc.) were more likely to be males at the full professor rank with more years of service at their college than faculty members in other groups. An examination of the distance between the four disciplinary groups based on personal variables revealed a significant F ratio for each pair of groups (see Table 7). Figure 1 displays the plots of the group centroids based on personal variables.

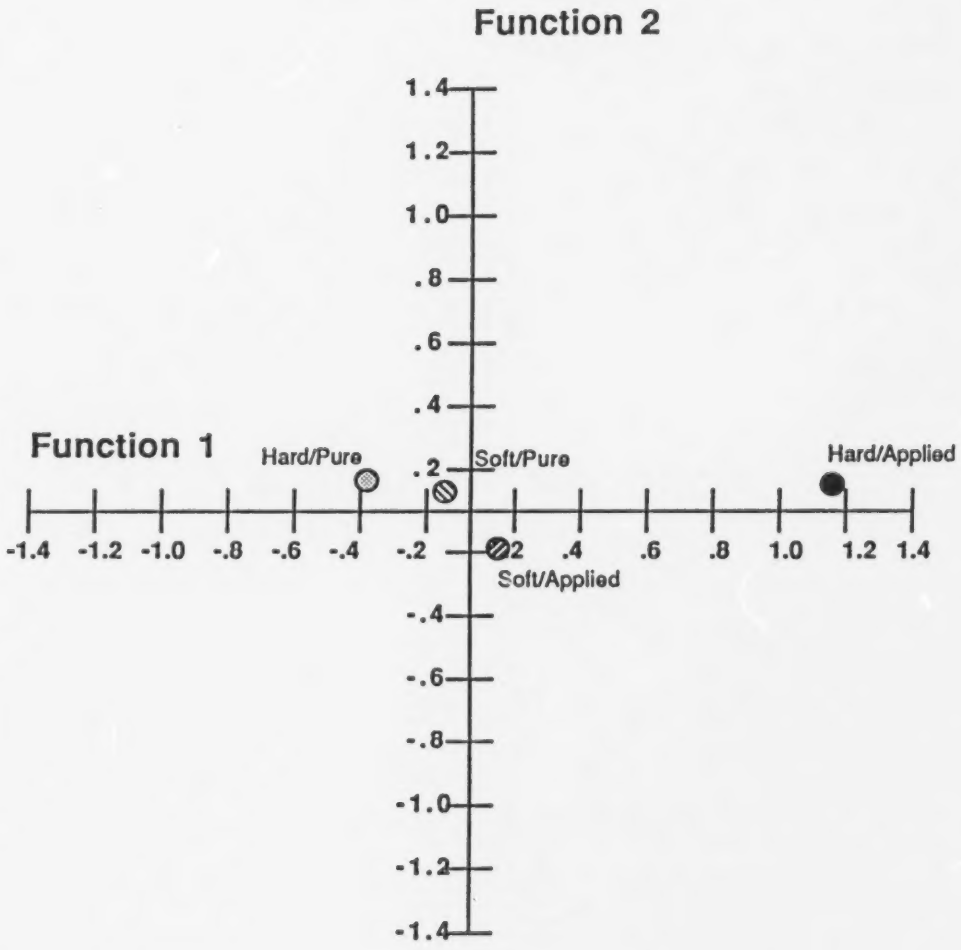

Figure 1. Plots of group centroids based on personal variables

Table 5

Major Discriminating Variables Within Four Variable Sets From Separate Discriminant Analyses

Variable Name	*F* to Enter	P	Correlation of Predictor Variables with Discriminant Scores on Significant Functions I	II	III
Personal Variables					
Gender	94.57	.00	.76	.54	.18
Academic Rank					
Assistant Professor	57.52	.00	.61	-.06	-.11
Associate Professor	4.09	.01	-.03	-.50	.65
Full Professor	56.90	.00	-.57	.57	-.54
Years at College	66.91	.00	-.63	.64	.45
Role Variables					
Intermittent	24.08	.00	.56	.06	-.22
Steady State	35.47	.00	-.67	-.25	.43
Linear Research	16.59	.00	.16	.91	.19
Linear Administration	19.91	.00	.51	.08	.79
Spiral	13.77	.00	.41	.25	.45
Intrinsic (Value) Variables					
Autonomy	8.50	.00	.42	.35	.64
Variety	11.99	.00	.62	-.18	.21
Service	4.31	.00	.33	.03	.15
Creativity	9.30	.00	.38	.63	.38
Leadership	20.34	.00	.79	-.36	.26
Specialization	18.79	.00	.72	.48	-.46
Extrinsic (Value) Variables					
Prestige	5.75	.00	-.35	.66	.66
Security	6.73	.00	.13	.92	-.36
Academic Involvement	16.80	.00	.91	.07	.42
Nonacademic Involvement	2.65	.05	.30	.05	.13

a significant F ratio for each pair of groups (see Table 7). Figure 2 displays the plots of group centroids based on role variables.

Intrinsic (Value) Variables

All six intrinsic variables met the entry criterion. These variables measured the importance that faculty members placed on intrinsic aspects of their work. Three significant functions emerged which explained 4.2% of the variance between groups. Variety, leadership, and specialization defined the first function, discriminating between the pure and applied disciplines. Specifically, faculty members in hard/applied disciplines (Nursing, Computer Science, etc.) placed greater importance on the availability of a variety of challenges, the opportunity to lead, and the opportunity to become highly specialized and competent in a specific disciplinary area than members of the other groups. Faculty members in the hard/pure group (Mathematics, Physics, Chemistry, etc.) valued these aspects the least of the four categories.

The second function was characterized by creativity, distinguishing hard/pure and soft/applied faculty members from those in soft/pure and hard/applied disciplines. This separation suggested that soft/pure faculty members valued the opportunity to create or develop something original more than members of the other disciplinary groups, particularly hard/pure and soft/applied faculty members. The third function, defined by autonomy, discriminated between hard and soft disciplines, with particular separation between the hard/applied and soft/applied groups. While the soft/applied faculty members valued the freedom to choose their own work activities and schedule, members of the hard/applied group valued this aspect the least of the four groups. An examination of the group distances revealed a significant F ratio for each pair of groups (see Table 7). Figure 3 displays the plots of group centroids based on intrinsic variables.

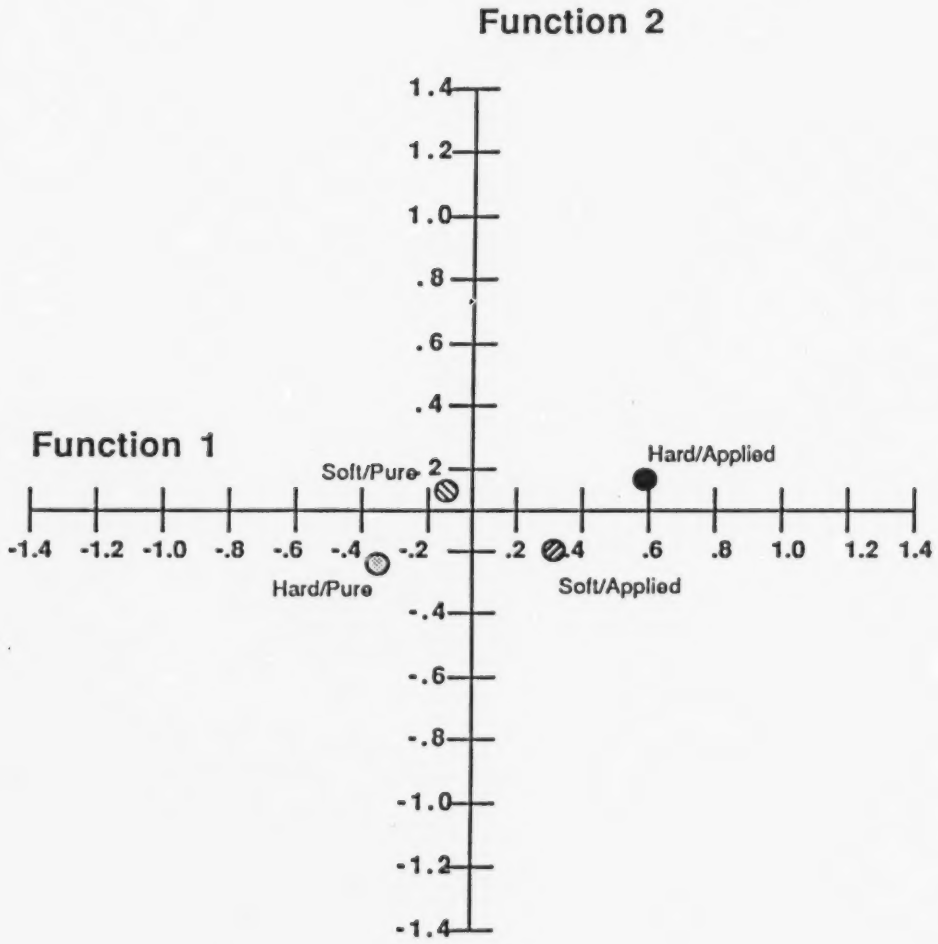

Figure 2. Plots of group centroids based on role variables

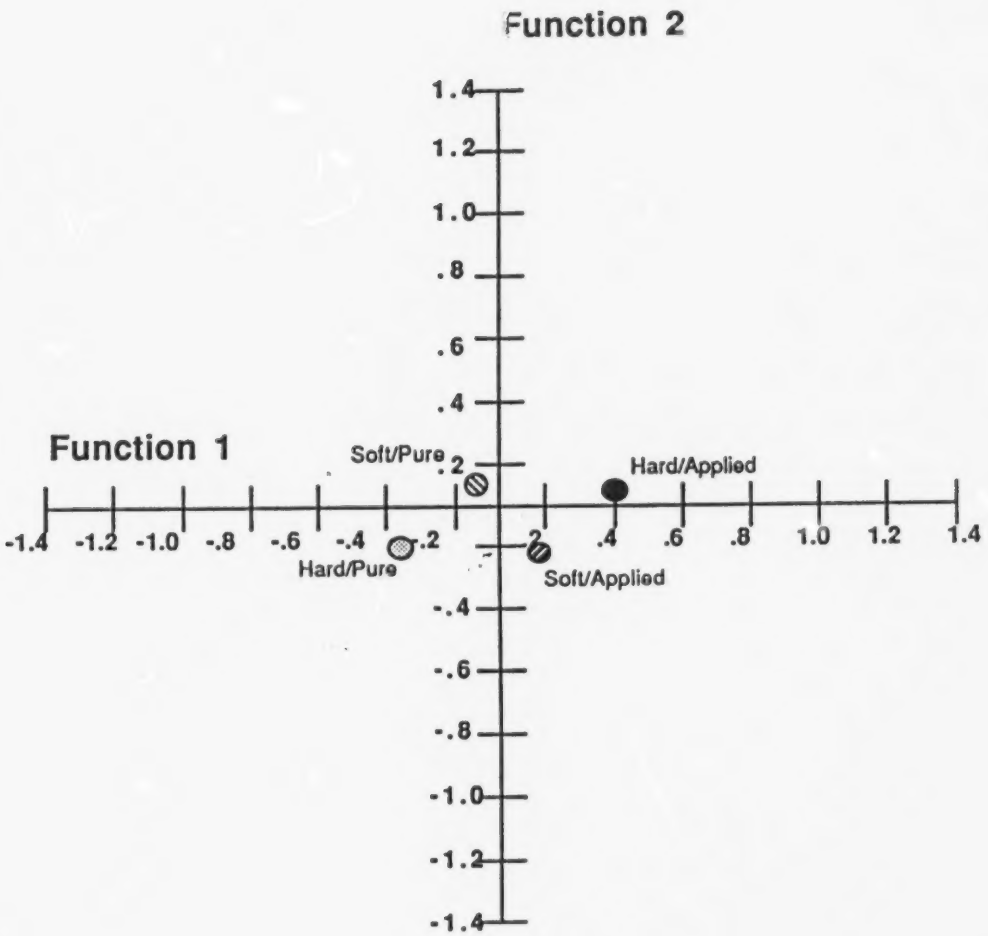

Figure 3. Plots of group centroids based on Intrinsic Value variables

Extrinsic (Value) Variables

As with the previous variable sets, all four extrinsic variables met the entry criterion for the stepwise discriminant analysis. Two significant functions explained 2.6% of the variance. The first function, characterized by academic involvement, suggested that faculty members in soft/pure and hard/applied disciplines valued participation in decision-making concerning academic issues at their institution more than their hard/pure and soft/applied colleagues. Soft/applied faculty members valued this aspect the least of the four faculty groups. The second function, defined by security, suggested that members of the hard/pure group placed less value on the opportunity to be in an organization that provides security through guaranteed work, benefits, and a good retirement than members of the other groups. An examination of group distances did not reveal a significant F ratio between the soft/pure and hard/applied groups. All other group pairs were significant, however. Figure 4 displays the plots of group centroids based on extrinsic variables.

Four-Group Model: Combined Variables

Since all of the variables from the separate analyses met the entry criterion, a single variable set was created for a combined stepwise discriminant analysis. Only one personal variable (full professor), one role variable (spiral), and one intrinsic variable (variety), failed to meet the F to enter criterion of the combined analysis (see Table 8). When the remaining personal, role, intrinsic, and extrinsic variables were entered into the combined analysis, the discrimination power increased beyond that of any of the separate variable sets. The combined analysis resulted in three significant functions that explained 23.9% of the variance between groups (see

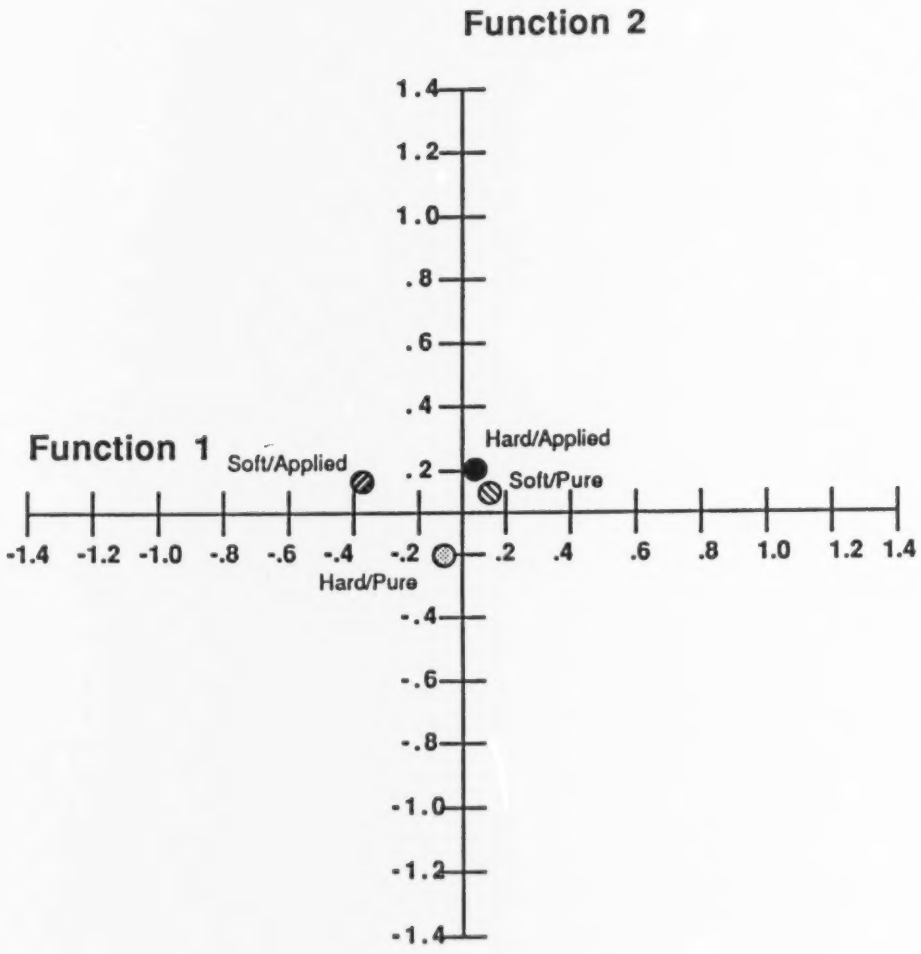

Figure 4. Plots of group centroids based on Extrinsic Value variables

Table 8

Discriminating Variables Within Four-Group Model From Combined Discriminant Analysis

Variable Name	F to Enter	P	Correlation of Predictor Variables with Discriminant Scores on Significant Functions I	II	III
Gender	94.57	.00	.62	.42	-.30
Years at College	74.92	.00	-.55	.16	.09
Linear Research	55.26	.00	.12	.44	.35
Linear Administration	46.65	.00	.29	-.05	.27
Steady State	41.20	.00	-.40	-.04	-.23
Academic Involvement	37.22	.00	-.09	.51	.01
Leadership	33.61	.00	.28	-.19	.30
Intermittent	30.57	.00	.33	-.05	.16
Assistant Professor	28.08	.00	.51	.11	-.17
Associate Professor	25.88	.00	-.01	-.20	.32
Creativity	24.04	.00	.11	.20	.51
Specialization	22.40	.00	.26	.22	.22
Autonomy	20.92	.00	.12	.06	.54
Prestige	19.62	.00	.12	-.13	.31
Security	18.48	.00	.10	.16	.42
Non-Academic Involvement	17.42	.00	-.03	.19	.15
Service	16.47	.00	.09	.00	.40
Full Professor	-----a				
Spiral	-----a				
Variety	-----a				

[a]Failed to meet F to enter criterion.

Table 4). Among the individual variable sets, the personal variables explained the most variance (14.2%). In light of the initial differences between the disciplinary groups in their demographic composition (gender and academic rank), it was predictable that personal variables would primarily define the first discriminant function.

Function one was characterized by female gender, fewer years at college, a rank of assistant professor, and to a lesser extent, a lack of identification with a steady state career concept. A comparison of group

means and centroids (Table 9) suggested that faculty members in applied disciplines tended to be female, had fewer years of experience at their institutions than their pure colleagues, held the rank of assistant professor, and did not expect to live out their professional lives as teachers at their institutions or a similar liberal arts college. Faculty members in hard/applied disciplines (Nursing, Computer Science, etc.) displayed a particularly strong relationship to this function. Conversely, faculty members in pure disciplines tended to be male, had more teaching experience than their applied counterparts, represented the senior faculty ranks, and reflected a commitment to pursuing a career in liberal arts colleges. Faculty members in hard/pure disciplines (Mathematics, Physics, Chemistry, etc.) reflected these characteristics more than any other faculty group.

The second function, defined by the extrinsic variable of academic involvement and a linear research career concept, separated the hard/pure and soft/applied groups from the soft/pure and hard/applied categories. A comparison of group centroids suggested that faculty members in soft/pure and hard/applied disciplines valued participation in decision-making on academic issues and aspire to a research university faculty position more than their hard/pure and soft/applied counterparts. Of the four groups, hard/applied faculty members (Nursing, Computer Science, etc.) reflected the strongest orientation to this function, while the soft/applied group (Management, Journalism, Education, etc.) displayed the weakest orientation to these characteristics. Figure 5 displays the plots of group centroids based on the combined variable set. An examination of the distance between the four disciplinary groups based on the combined variable set revealed a significant F ratio for each pair of groups (see Table 10).

Table 9

Group Centroids for Discriminant Functions Based on Four-Group Model

Group	Function 1	Function 2	Function 3
Hard/Pure	-0.47	-0.13	-0.23
Soft/Pure	-0.16	0.16	0.07
Hard/Applied	1.24	0.29	-0.19
Soft/Applied	0.33	-0.39	0.09

Table 10

F Statistics and Significances Between Pairs of Groups for Combined Variable Set

Group	Hard/Pure	Soft/Pure	Hard/Applied	df
Soft/Pure	6.83*			17/3136
Hard/Applied	32.52*	26.76*		
Soft/Applied	14.74*	15.17*	14.80*	

*$p < .01$

The third function explained 1.7% of the between-group variance, separating faculty members in hard disciplines from those in soft disciplines. This function was characterized by three intrinsic variables (autonomy, creativity, service) and one extrinsic variable (security), suggesting that faculty members in soft disciplines valued the freedom to choose their own work activities and schedules, the opportunity to create or develop something original, the opportunity to be of service to others, and the opportunity to work in an organization that provides security through

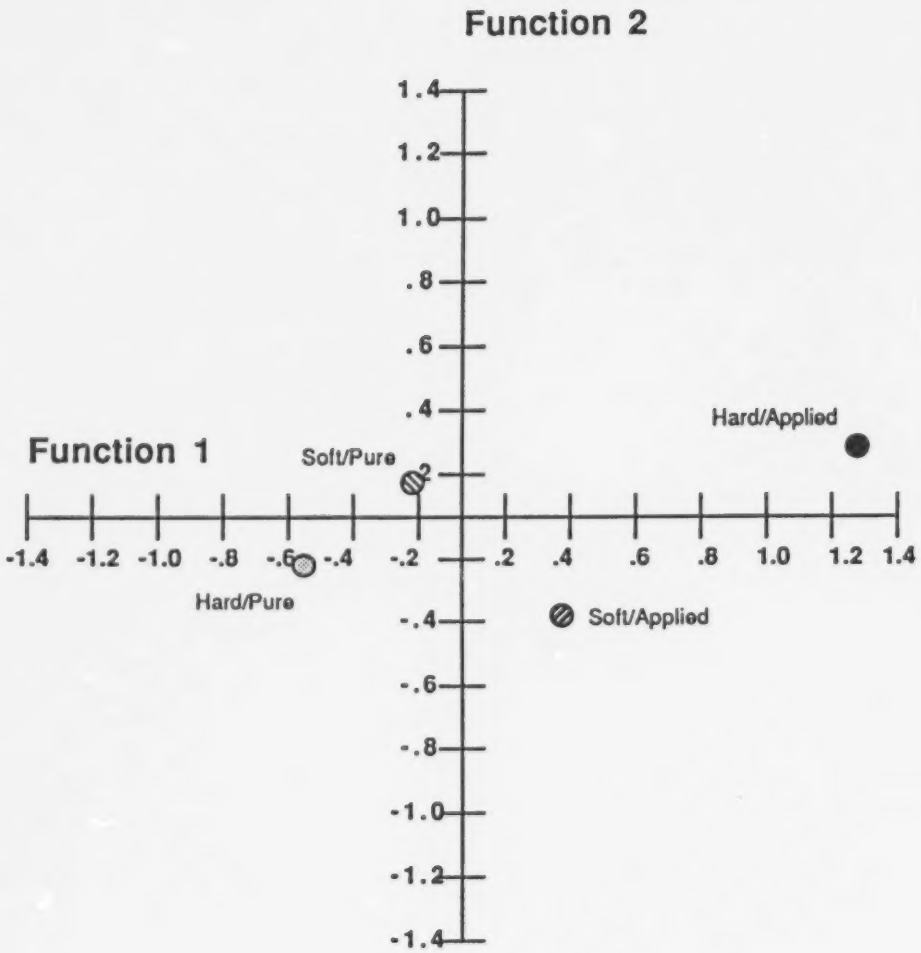

Figure 5. Plots of group centroids based on four-group model

guaranteed work and good benefits more than faculty members in hard disciplines. Of the soft disciplinary categories, the soft/applied (Management, Journalism, Education, etc.) group displayed the strongest orientation to the third function, while the hard/pure group (Mathematics, Physics, Chemistry) displayed the weakest orientation of the hard categories.

A posterior classification attempt, structured to assume that the various disciplinary group sizes would affect the probability of group classification, allowed correct classification of 38.0% of the cases. A classification attempt by chance would normally allow correct classification of 25% of the cases. By disciplinary group, the posterior attempt allowed correct classification of 50.2% of hard/pure faculty members, 29.3% of soft/pure members, 74.7% of hard/applied members, and 35.6% of soft/applied faculty members. The classification was performed on the same data from which the discriminant functions were derived to serve as a check on the efficacy of the results.

Discussion

Multiple group discriminant analysis served as a helpful tool in identifying disciplinary differences in personal characteristics, career concepts, and work value variables among liberal arts college faculty members. Of the four individual variable sets, the personal variables displayed the greatest amount of discriminating power. The discriminating power of the personal variable set was confirmed when gender, years at college, and rank were identified as three of the four characteristics of the first discriminant function.

Although each individual variable set displayed only a minimal ability to discriminate between the four disciplinary groups, the discrimination power of

the analysis increased when all eligible variables were entered into a combined variable set. In spite of a substantial amount of unexplained variance, the discriminant analysis did permit the identification of four distinct disciplinary groups based on personal and role variables, as well as the intrinsic and extrinsic characteristics valued by liberal arts college faculty members. An analysis of group centroids revealed differences between the four disciplinary groups in their demographic composition, in what they valued about their work, and in how they envisioned the development of their careers. The identification of four distinct groups permitted a summarization of dominant and distinct characteristics for each of the disciplinary categories (see Table 11). While the presence of a particular characteristic in one group did not preclude its presence in the others, the combination and relative strength of faculty characteristics for each group was unique.

Disciplinary characteristics. Among the liberal arts college faculty members studied, those in hard/pure disciplines, such as astronomy, biology, chemistry, mathematics, and physics, were predominantly male, held the rank of full professor, and reported more years of teaching experience at their institution than members of the other three groups. In addition, hard/pure faculty members reflected a strong commitment to the liberal arts college, and reported a high level of expectation to live out their professional lives at their present college or a similar institution. While faculty members in the soft/pure disciplines, such as the humanities, the arts, and the behavioral sciences, reflected a number of personal characteristics similar to those of the hard/pure group, they also were characterized by a unique combination of role, intrinsic, and extrinsic variables. As with hard/pure faculty members, those teaching in the soft/pure disciplines tended to be male, hold senior rank, and reported more years of experience at their institution than the

Table 11

Summary of Faculty Characteristics from Discriminant Analysis

Disciplinary Group	Characteristics
Hard/Pure	Male Full Professor More Years at College Steady State Career Concept
Soft/Pure	Linear Research Career Concept Values Creativity Values Academic Involvement
Hard/Applied	Female Assistant Professor Intermittent Career Concept Linear Research Career Concept Values Variety Values Specialization Values Leadership
Soft/Applied	Intermittent Career Concept Values Autonomy Values Security

average for all groups combined. The soft/pure group also reflected an orientation to the linear research career concept, and valued the opportunity to be creative, as well as the opportunity to participate in academic decision making.

In contrast to the hard/pure and soft/pure groups, faculty members in hard/applied disciplines, such as nursing and computer science, were predominantly female, held the faculty rank of assistant professor, and reported fewer years of service at their institution than any other faculty group. Regarding their career concept, the hard/applied group was characterized by an intermittent role, and shared an orientation to the linear research role with soft/pure faculty members. In addition, hard/applied

faculty members valued the availability of a wide variety of challenges in their work, the opportunity to lead others, and the opportunity to become highly specialized in a specific area.

Faculty members in soft/applied disciplines, such as business, management, education, journalism, and counseling, share many of the same personal variables as the hard/applied group. While the soft/applied group was not predominantly female, it displayed a higher percentage of women than that of the hard/pure and soft/pure groups. As with the hard/applied group, soft/applied faculty members reported a higher percentage of assistant professors and fewer years of service than their hard/pure and soft/pure colleagues. Soft/applied faculty members valued the freedom to choose their own work activities, as well as the opportunity to work in an organization that provides security.

Biglan's dimensions. Of the three disciplinary dimensions proposed by Biglan (1973) for the analysis of faculty differences, the pure/applied dimension was the most discriminating, as evidenced by the frequency with which the first discriminant function displayed differences between faculty members in pure and applied disciplines. While the first discriminant function separated pure and applied disciplines, the third function separated hard and soft disciplinary groups. In light of research showing the life/nonlife Biglan dimension to be the least significant of the three, the small percent of variance explained by the third function (1.7%) helps justify the exclusion of the life/nonlife dimension from this study. The second discriminant function did not correspond to a Biglan dimension, but was useful in identifying disciplinary differences between faculty members in hard/pure and soft/applied versus soft/pure and hard/applied groups.

Gender segregation. Based on the literature review for this study, it would be expected that the four disciplinary groups would differ in their

level of representation by women, and that certain characteristics and perceptions would accompany their composition. Both the descriptive statistics and the discriminant analyses support the assumption. For the discriminant analysis, the strongest differences are found between the most male-dominated group (Hard/Pure) and the most female-dominated group (Hard/Applied). When examining the most significant variables, these two groups display the greatest distance, and support previous studies on gender differences in higher education. Specifically, this study suggests that women are segregated to hard/applied fields (primarily nursing and allied health fields), hold junior faculty rank, do not envision their present circumstances as permanent, see themselves in a variety of professional roles (even moving to research institutions), desire additional opportunities to specialize in their discipline, and look for leadership roles on and off campus. Conversely, male faculty members dominate the hard/pure fields (Mathematics and the Sciences), hold Full Professor rank, have worked at their institution longer than their counterparts in other groups, and envision a lifetime in their present circumstances.

Conclusions and Implications

Based on the results of the statistical analyses, the research design of this study served as a helpful tool in identifying disciplinary differences among liberal arts college faculty members. Use of Austin and Rice's (1987) data permitted a detailed examination of a large sample of faculty members at similar institutions by building on their initial findings and recommendations. In addition, a secondary analysis of their sample allowed

this research study to focus primarily on research design and data analysis, rather than simply the acquisition and coding of faculty responses.

The statistical analysis suggests that disciplinary groups of liberal arts college faculty members display differences primarily in their demographic composition rather than in their career concepts or what they value about their work. The use of Biglan's (1973) dimensions proved helpful in discovering faculty differences. Due to the small size of many of the participating colleges, many individual departments would be too small for significant analysis. Biglan's dimensions permitted a more detailed analysis of the faculty workplace than possible through a study of all faculty members combined. Of the two Biglan dimensions utilized in the study, the pure/applied dimension explained the most pronounced faculty differences, particularly in personal variables, such as gender, years at college, and academic rank. This finding supports Finkelstein's (1987) contention that women are separated by discipline, suffer from disproportionate representation at the lower faculty ranks, and play a lesser role in leadership positions.

While this preliminary study was not designed to examine gender differences alone, it provides introductory information on the relationship between faculty gender and disciplinary affiliation. In addition, disciplinary groups that differ in their gender composition also reflect differences in other personal variables, career concepts, and work values. The research findings also suggest, however, that a significant number of differences between faculty groups remain unexplained. Two of the most probable sources of unexplained differences are the limitations of the Biglan (1973) model and the selection of variables to be analyzed.

Future uses of Austin and Rice's (1987) data should address gender differences in faculty perceptions and values without the disciplinary

component. In addition, additional studies of gender segregation should consider alternative research methods and designs. In particular, qualitative studies or a combination of approaches could enhance the preliminary findings outlined in this secondary analysis.

An increased awareness of differences in faculty characteristics and needs can assist members of the professoriate in exerting more control over the design and operation of their work environment. Through increased communication and collaboration with administrators, faculty members can be instrumental in developing an exemplary academic workplace. The practical implications of this study concern institutional policies of faculty recruitment, review, and tenure. These findings suggest that faculty members must make a concerted effort to attract female candidates to their institution, particularly in the three male-dominated categories. In addition, personnel policies should be reviewed and revised to encourage the retention and promotion of female faculty members. To help meet the demand for women faculty members, liberal arts colleges should serve as nurturing environments that identify and encourage students to enter the professoriate. This mentoring role for faculty members will assist the institution in fulfilling its mission as a caring community, while equipping a new generation of women professors with a small liberal arts perspective.

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Disciplinary Categories (Biglan's Dimensions)

Hard/Pure

- Mathematics
- Physics
- Chemistry
- Geology
- Biology

Soft/Pure

- Music
- Fine Arts
- Art
- Languages
- Classics
- Philosophy
- History
- English
- Psychology
- Political Science

Hard/Applied

- Architecture
- Computer Science
- Engineering
- Animal Science
- Dentistry
- Nursing
- Forestry

Soft/Applied

- Accounting
- Finance
- Management
- Marketing
- Economics
- Journalism
- Law
- Education